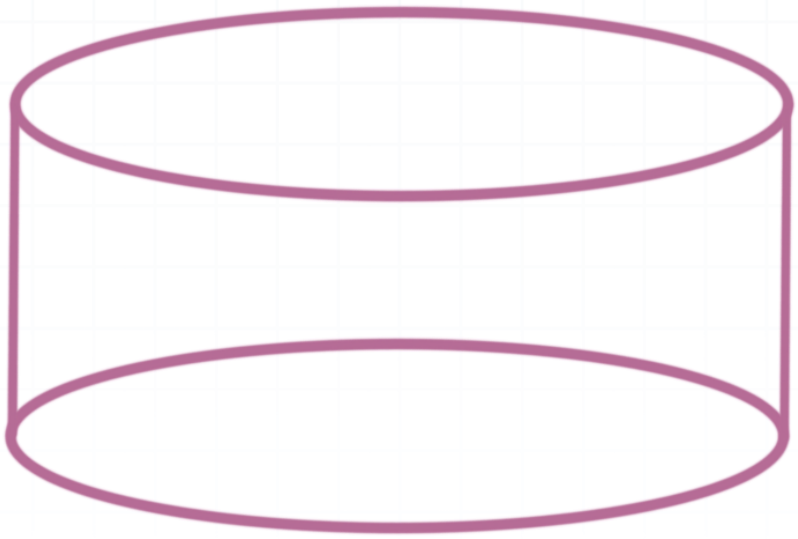
Nets/Volume/Surface area of cylinders

In this lesson we'll look at the nets, volume, and surface area of cylinders.

Cylinders

A cylinder has two parallel circular bases.



The net of a cylinder looks like a rectangle with two circles attached at opposite ends.

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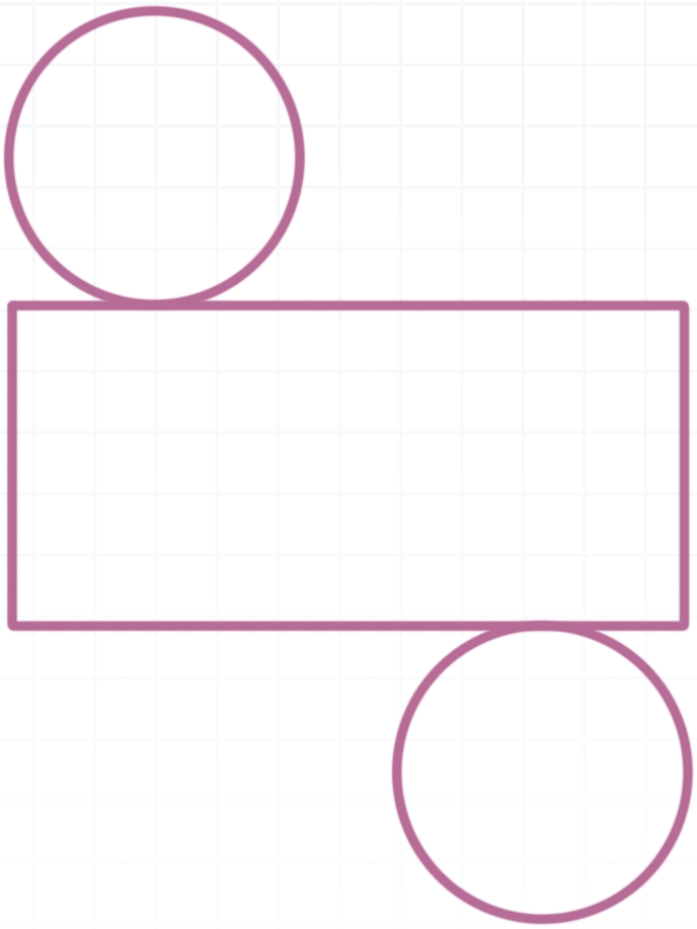
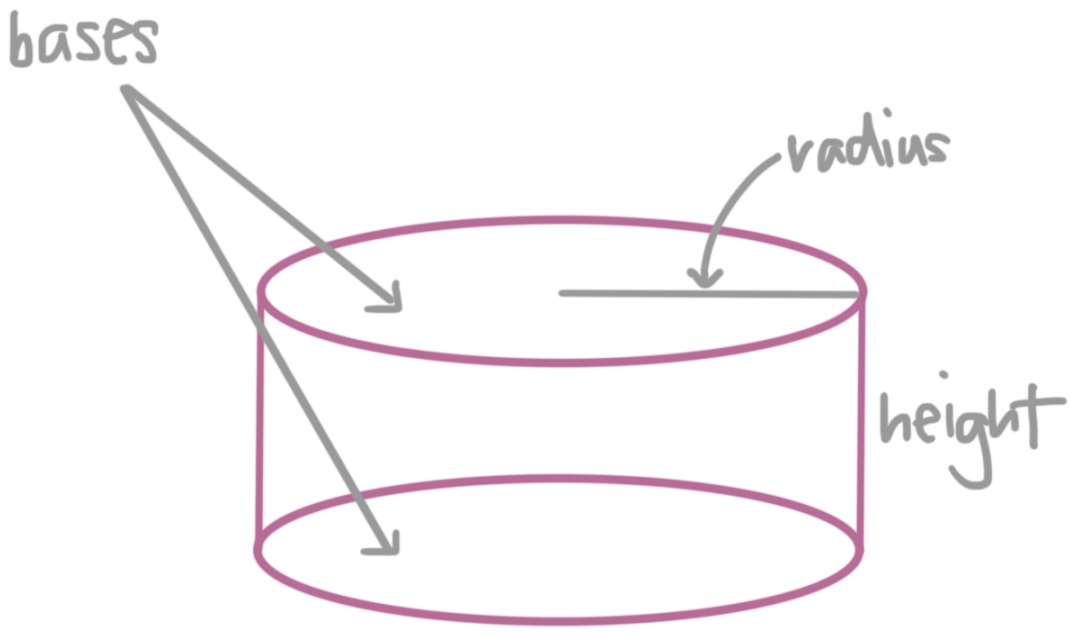


Parts of a cylinder

You'll need to know the parts of a cylinder.



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Volume of a cylinder

The volume of a cylinder is equal to the product of π, the square of the radius, and the height of the cylinder. Sometimes we use the estimated value of $\pi \approx 3.14$, and sometimes we use the symbol π to represent the exact value.

$$V = \pi r^2 h$$

Surface area of a cylinder

The surface area of a cylinder is given by

$$S = 2\pi rh + 2\pi r^2$$

where r is the radius of the cylinder and h is the height of the cylinder.

Let's do a few examples.

Example

What is the area of the rectangle shown in the net of the cylinder?

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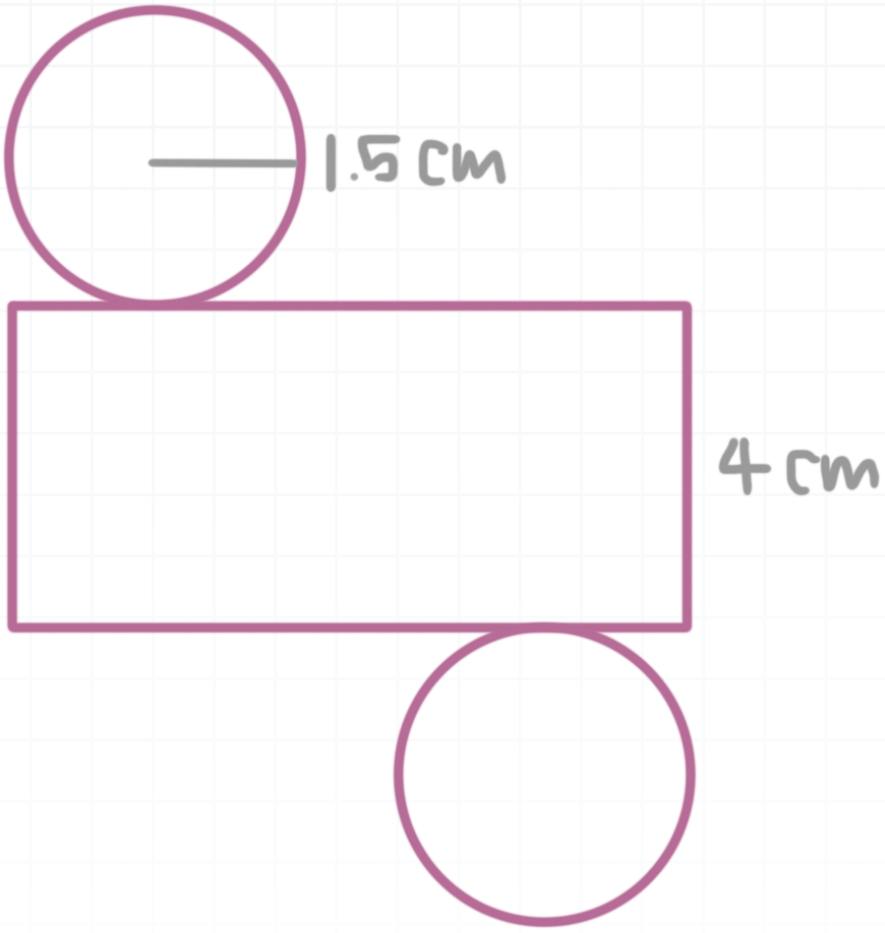
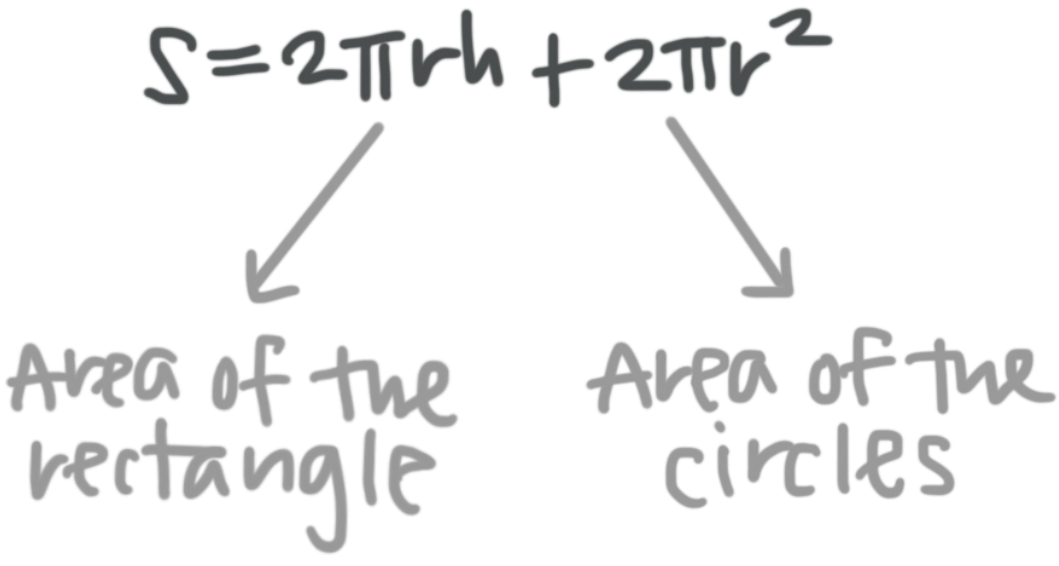


The area of the rectangle in the net of the cylinder is the circumference of the circle, multiplied by the height of the cylinder. The circumference of a circle is $C = 2\pi r$, so the area of the rectangle is $A = 2\pi rh$. You'll notice this shows up in the first part of the surface area formula for a cylinder.



Let's go ahead and calculate the area.

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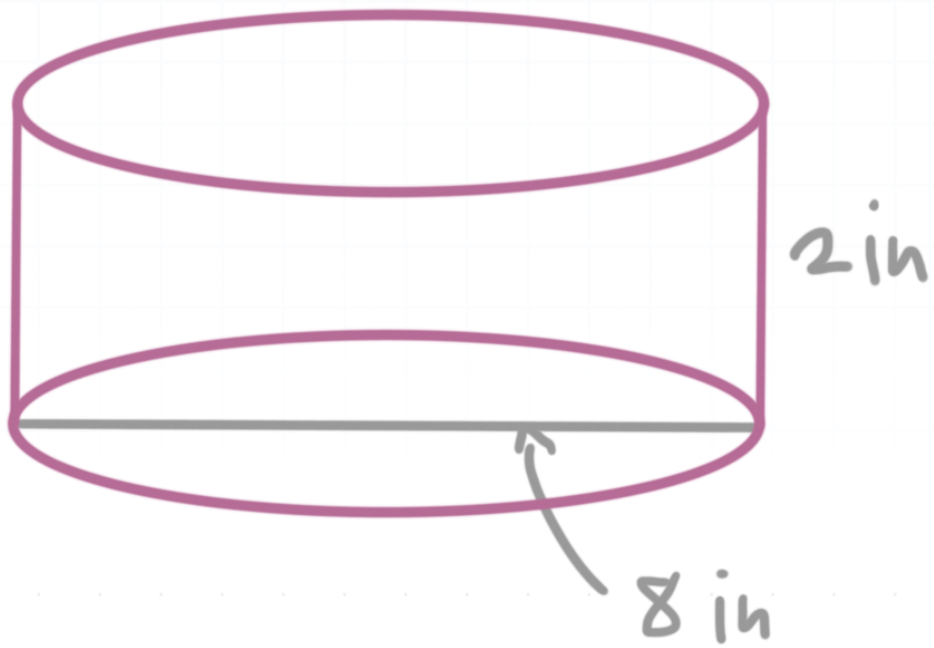
$$A = 2\pi(1.5)(4)$$

$$A = 12\pi \text{ cm}^2$$

Let's do a volume problem.

Example

What is the volume of the cylinder? Use $\pi = 3.14$.



Use the formula for volume.

$$V = \pi r^2 h$$

The diameter of the cylinder is 8, so we need to divide it by 2 to get the radius.

$$r = \frac{d}{2} = \frac{8}{2} = 4$$

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Plugging in the dimensions of the cylinder, we get

$$V = 3.14(4)^2(2)$$

$$V = 100.48 \text{ in}^3$$

Let's do a surface area problem.

Example

A cylinder has a radius of 12 ft and a surface area of $1{,}356.48$ ft^2. What is the height of the cylinder? Use $\pi = 3.14$.

Plugging what we know into the surface area formula, we have

$$S = 2\pi rh + 2\pi r^2$$

$$1{,}356.48 = 2(3.14)(12)h + 2(3.14)(12)^2$$

Now we can solve for the height.

$$1{,}356.48 = 75.36h + 904.32$$

$$452.16 = 75.36h$$

$$\frac{452.16}{75.36} = h$$

$$h = 6 \text{ ft}$$

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